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ABSTRACT

A study re-examined the hypothesis that an identifiable register of child-directed speech (motherese) contributes to child language acquisition. The hypothesis was studied from two perspectives: (1) that it has not been documented adequately at earlier ages; and (2) that individual differences in style of language acquisition interact with maternal measures to mask the effectiveness of motherese. Subjects were 45 mothers and their children at ages 13 months and 20 months. Mother-child interactions were videotaped at each age, and mothers were administered a questionnaire when the child was 13 months to establish the child's language comprehension and production. Two groups of children, earlier and later talkers, were selected for one study, in which maternal language was compared to size of productive vocabulary. Results indicate that the mothers of the groups differed at this stage, suggesting a need for even younger subjects. In the second study, the total sample was divided into two groups according to the child's 20-month stylistic preference (expressive or referential). Lagged associations between maternal 13-month measures and child 20-month mean length of utterance were examined within each group. Results show that maternal variables have different effects depending on the child's adopted strategy, suggesting that in previous research, individual differences have masked the effects of motherese. (MSE)

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Early relations between mother talk and language development: Masked and unmasked

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For some time researchers into language acquisition have been intrigued by the fact that children acquiring language proceed at different rates. Such variation has led researchers to examine possible environmental correlates, with a particular focus on maternal input. The existence of an identifiable register of child directed speech or "motherese" has been well-documented. However, studies aimed at examining the effectiveness of child directed speech (e.g. Newport, Gleitman & Gleitman, 1977; Furrow, Nelson & Benedict, 1979; Scarborough & Wyckoff, 1986) have yielded inconsistent results, and many early proponents of the role of maternal input have since retreated to a "no effects" conclusion (see for example, Shatz & Gelman, 1973 and Shatz, 1982).

Since the early 1970's it has become increasingly obvious that children not only differ in their *rate* of language acquisition, but that there are also differences between children in terms of their *style* or strategy for entering the linguistic system. Bloom's (1970) claim of individual differences between the children in her study received almost immediate supporting evidence from Nelson's (1973) monograph. Referential and expressive children, as Nelson characterized them, differ in the composition of their early vocabularies, with referential children favoring primarily common nouns, while expressive children have vocabularies containing more personal-social words and unanalyzed formulae.

In the present paper we re-examine the status of the "motherese" hypothesis from two different perspectives. First, we document evidence that the hypothesis has not been adequately tested in studies to date. Most studies examining the effectiveness of child directed speech (CDS) have looked at children who were at least 18-months old at the start of the study. In this study we uncover relations between maternal and child language at 13 months - some 5 months before other studies have examined the possible facilitative effects of motherese - and claim that prior studies have been looking for such effects too late.

Further we explore the hypothesis that individual differences in *style* of language acquisition interact with maternal measures to mask the effectiveness of child directed speech. Prior studies of the role of maternal input have not assessed the strategies adopted by the children. It is our contention that it may be impossible to demonstrate consistent effects of child directed speech unless individual differences are taken into account.

Method

Subjects

Forty-five mothers and their children participated in this longitudional study. Mean age at the 13-month visit was 403 days and at the 20-month visit was 619 days. Based on Hollingshead's Index (1975) all children came from middle to upper socioeconomic status households (mean SES = 59.4; range 48 to 66). The sample included 24 females and 21 males, with 36 first-born children.

Descriptive statistics are based on the full sample of 45 children. Thirty-six children, 18 *earlier talkers* and 18 *later talkers* were selected from the overall sample for Study 1. All 45 children were included in the analyses for Study 2, when the sample was dichotomized into a *referential group* ($N = 20$) and an *expressive group* ($N = 25$).

Procedure

At 13 months all 45 subjects were videotaped interacting with their mothers in their

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own homes during a 15-minute free-play session. A box of toys and picture books was provided by the experimenter. Mothers were aware that the focus of the study was their child's use of language, and they were asked to interact normally and not to attempt to elicit language from their child. During videotaping the experimenter sat at the child's eye level, on the floor using a hand-held camera. Videotaping commenced once the mother and child had become engaged in the activity itself, and, as far as could be judged, were indifferent to the presence of the camera. All dyads were videotaped again at 20 months for 15-minutes during free-play. (Children were also observed in a meal context at 13 and 20 months, but those data are not included here.)

In addition to the observational data, at the 13-month session mothers were administered a structured questionnaire (Snyder, Bates, and Bretherton, 1981) designed to establish the child's comprehension and production of language. Mothers were informed that no child at 13 months comprehends or produces all of the words in question, and were also provided with concrete examples in which a child's apparent comprehension of a word might be attributed to other factors, such as tone of voice, accompanying gesture or contextual support. When it was clear that the mother understood these points, she was questioned extensively regarding each item, and systematically probed about the context in which any word was comprehended or produced.

Measures

The interview was scored following Snyder et al. (1981), and separate scores for production and comprehension were obtained for the categories of common nouns, proper nouns, and other words and phrases (non-nouns). Maternal interviews were used as the primary source of data to establish each child's 13-month vocabulary, since the range of a child's vocabulary was unlikely to emerge during the videotaped 13-month session. Snyder et al. (1981) have found that mothers can be reliable observers when interviewers ask specific questions and mothers are required to provide examples. All subjects in the group of 18 ***earlier talkers*** had productive 13-month vocabularies of at least 15 words according to the maternal questionnaire. The 18 ***later talkers*** had vocabularies of seven words or less at 13 months.

Maternal language measures were assessed from the 13-month videotapes. Maternal referencing behavior was coded following Furrow & Nelson (1984). Each mother's use of nominals was divided into the major categories of nouns and pronouns, and the number and proportion of object and person references were also calculated. All nominals were further subdivided into the categories of object-noun, object-pronoun, person-noun, person-pronoun, abstract-noun and abstract-pronoun, and proportions calculated for each subcategory. The total number of nominals exceeded the combined number of person and object references because of the existence of abstract nouns, and the use of pronouns to refer to events or actions.

In addition, the function of each maternal utterance was coded, using a modified version of Folger and Chapman's (1978) coding scheme. Open-ended questions, such as, "What's that?" (Requests for Information) were coded separately from questions eliciting "yes/no" answers (Requests for Confirmation and Permission).

Study 1

Two groups of children were selected for Study 1 based on the reported size of each child's productive vocabulary. The group of ***earlier talkers*** was composed of all children producing 15 or more words at 13 months (N=18), while the group of ***later talkers*** contained all children producing 7 words or less (N=18). Measures of 13-month maternal language were compared for these two groups, and lagged associations to 20-month MLU were examined.

Study 2

The total sample was divided into 2 groups according to the child's 20-month stylistic

preference. Stylistic preference at 20 months was assessed from the child's spontaneous noun-to-total-word ratio. Children with a ratio of 40% or less formed the *expressive group* ($N = 25$), while all children who had a ratio greater than 40% were grouped into the *referential group*. Lagged associations between maternal 13-month measures and child 20-month MLU were examined within each group.

Results

The results are presented in several parts. First, descriptive statistics for the 13-month child and maternal variables are reported. These are followed by descriptive 20-month statistics. The results of Study 1 involve *t-test* comparisons of the mothers of the earlier and later talkers, followed by predictive relations to 20-month MLU for the two groups. Finally, the results of Study 2 present similar lagged associations between 13-month maternal measures and 20-month MLU for the total sample, followed by separate relations within the expressive and referential groups.

Descriptive Statistics for 13-month Child Language

Descriptive statistics for 13-month language comprehension and production as reported by maternal questionnaire are presented in Table 1. It can be seen that, according to maternal report the sample contained children who differed considerably in terms of rate of language acquisition. All children comprehended at least some common nouns, proper nouns and other words, but one child had not yet produced any words, and the child with the largest productive vocabulary had 79 different words in his vocabulary at 13 months. Similarly, it is clear from the range of common nouns shown in Table 1 that the sample provided a range of variation consistent with stylistic differences.

Table 1
Descriptive Statistics for 13-month Child Language Measures (N=45)

	MEAN	S.D.	RANGE
COMPREHENSION			
TOTAL	64	24	23-118
# COMMON NOUNS	28	17	4-69
% COMMON NOUNS	40	12	17-63
% NON-NOUNS	49	10	29-70
PRODUCTION			
TOTAL	19	20	0-79
# COMMON NOUNS	10	13	0-54 †
% COMMON NOUNS	41	23	0-73 †
% NON-NOUNS	34	20	0-100 †

† Range represents children producing $\geq$ 1 word

Descriptive Statistics for 13-month Maternal Language

Descriptive statistics for maternal references are presented in Table 2. On the average, mothers produced about 18 utterances per minute, each containing one nominal reference. The average ratio of pronoun to noun usage was 3:2, with slightly more references to objects than to people. However, a glance at the reported ranges for these variables reveals that such group statistics obscure variation between mothers. Mothers produced as few as 9 or as many as 30 utterances per minute, and some mothers produced twice as many nominals per utterance as others. Mothers also varied considerably in the extent to which they emphasized nouns, objects and persons in their references.

Table 2
Descriptive Statistics for 13-month Maternal References (N = 45)

	NUMBER			PERCENT		
	$\bar{X}$	SD	RANGE	$\bar{X}$	SD	RANGE
UTTERANCES	277	79	134-458			
NOMINALS	328	110	102-665			
NOUN	125	50	35-272	38	7	24-57
PRONOUN	203	73	67-393	62		43-76
OBJECT	149	56	34-298	45	9	30-72
PERSON	118	47	46-250	36	7	21-52
OBJECT NOUN	83	38	22-184	25	8	10-52
PERSON PRON	87	36	38-193	27	6	11-37
OBJECT PRON	65	29	12-133	20	5	10-32
PERSON NOUN	31	17	2-77	9	4	1-21
ABSTR. NOUN	11	8	0-33	3	2	0-8
ABSTR. PRON	51	21	15-99	16	5	6-29

The picture is similar when maternal functions are examined. Table 3 presents descriptive statistics for maternal language functions at 13 months. Again, it is clear that there was considerable variation between mothers. For example, only 2% of one mother's utterances were descriptions, compared with 37% for another mother. While most mothers provided some performative play, (nursery rhymes, peek-a-boo routines, riddles and dramatic phone talk), for one mother this function comprised 21% of her total utterances. Similarly, conversational devices, which are simply a means of maintaining or establishing contact, provided 30% of another mother's utterances. On the average, descriptions and requests for action were the two major functions, totalling approximately 40% of all utterances. However, with such variation within the sample, average measures have very little significance. It should also be remembered that the most talkative mother, (in terms of the number of utterances), provided more than three times as many utterances as the least talkative mother.

Table 3
Descriptive Statistics for 13-month Maternal Functions (N = 45)

	NUMBER			PERCENT		
	$\bar{X}$	SD	RANGE	$\bar{X}$	SD	RANGE
DESCRIPTION	58	25	3-116	21	7	2-37
REQ. INFO.	21	12	0-57	7	4	0-16
PERFORM.	13	10	0-41	5	4	0-21
REFER. REPET.	3	5	0-25	1	2	0-7
STATEMENT	30	22	8-136	10	5	5-32
REQ. PERMISS.	27	12	11-54	10	4	4-19
REQ. ACTION	57	28	14-155	20	7	8-35
CONV. DEVICE	35	16	11-90	13	5	3-30
EXPRESS. REPET.	4	4	0-17	2	1	0-6
SOUNDS	25	14	4-67	9	5	3-22

Descriptive Statistics for 20-month Child Language

Descriptive statistics for 20-month child language measures are presented in Table 4. At 20 months only three children had MLUs of 1.00 or less. Twenty-four children had MLUs between 1.01 and 1.50, falling into Brown's (1973) Early Stage I, and thirteen children fell into Late Stage I (MLU 1.50 to 2.00). An additional five children had MLUs between 2.01 and 2.90. It is clear that there was considerable variation between children both in terms of their rate of language acquisition and in terms of their emphasis upon nouns.

Table 4
Descriptive Statistics for 20-month Child Language Measures (N = 45)

	MEAN	S.D.	RANGE
NOUNS #	37.8	32.3	0-156
NOUNS %	37.7	17.9	0-76%
PRONOUNS #	20.9	18.9	1-74
PRONOUNS %	20.7	15.0	2-49%
OTHER #	45.0	35.0	4-145
OTHER %	43.0	13.8	11-69%
MLU	1.49	.44	.70-2.90
MaxLU	2.76	1.15	1.00-6.00

Study 1

When the mothers of the *earlier* and *later talkers* are compared with *t*-tests several differences are found. First, it should be noted that there were no differences between the two groups in terms of the number of maternal utterances or total number of nominals. However, the *earlier talkers* at 13 months were being exposed to a significantly higher percentage of nouns, object references and object nouns than the *later talkers*, whose mothers provided a higher percentage of abstract references (both nouns and pronouns). There were also significant differences between the two groups of mothers in terms of the functions of their utterances, as Table 5 reveals. Mothers of children with larger vocabularies provided a higher percentage of descriptions and referential repetitions. In contrast, mothers of the later talkers provided more requests for action and conversational devices. The relation between requests for action and slower language acquistion is consistent with several other studies.

Table 5
Comparisons of 13-month Maternal Functions & References for Earlier and Later Talkers

	E.T.	L.T.	t
REFERENCES:			
% NOUN	41	35	2.54*
% OBJECT	49	40	3.25**
% OBJ. NOUN	30	21	3.69**
% ABSTRACT	17	21	- 2.64*
FUNCTIONS:			
% DESCRIPT.	24	17	3.13**
% REF. REPETIT.	2.3	.2	3.77**
# REF. REPETIT.	6.4	.3	3.48**
% REQ. ACTION	17	22	- 2.43*
# REQ. ACTION	42	60	- 2.30*
# CONV. DEVICE	29	40	- 2.04*

* $p < .05$; ** $p < .005$

Selected lagged associations between 13-month maternal references and functions and 20-month MLU for the *earlier talkers* and *later talkers* are displayed separately in Table 6. It should be noted that there were no significant relations between any of the maternal language variables and the child's level of grammatical advancement at 20 months for the group of *later talkers*. For the group of *earlier talkers*, however, there were several relations. Maternal number of object references, object nouns and repetitions of child nouns were all positively related to 20-month MLU, while percentages of person nouns and requests for action were negatively related.

Table 6
Relations between 13-month Maternal Measures and 20-month MLU

	EARLIER (N = 18)	LATER (N = 18)
MEAN MLU	1.75 s.d. = .51	1.27 s.d. = .28
MATERNAL REFERENCES:		
# OBJECTS	.60**	.19
# OBJECT NOUN	.57**	.13
% PERSON NOUN	-.49*	-.06
FUNCTIONS:		
# REF. REPETIT.	.50*	.19
% REF. REPETIT.	.51*	.19
% REQ. ACTION	-.47*	.36

* $p < .05$; ** $p < .02$

The incidence of referential repetitions raises the issue of whether this should be regarded as an indication of child influence upon maternal language. Mothers of the two groups did differ significantly in terms of number and percent of maternal repetitions of children's nouns. Since *later talkers* were producing fewer words, they also produced fewer nouns, and, therefore, provided fewer opportunities for mothers to repeat them. For *later talkers*, therefore, the failure to find an association between this variable and 20-month MLU may be the result of dealing with a truncated range. However, the relationship between referential repetitions and 20-month MLU for the *earlier talkers* cannot be dismissed as merely an artifact. For this group, 20-month MLU was not significantly related to 13-month noun usage. The relations between 13-month maternal referential repetitions and 20-month MLU are unaffected by partialling out the effect of child noun usage at 13-months.

Study 2

Table 7 displays relations between 13-month maternal language measures and 20-month MLU for the total sample of 45 children. While several statistically significant relations were found, it should be noted that the amount of variance explained by these variables is low (between 9% and 36%). Moreover, when multiple regressions are run, (partialling out the effect of the child's vocabulary size at 13-months), only two variables are found to make a significant unique contribution to 20-month MLU, and each makes a very small contribution.

However, the aim of this study was to explore the possibility that individual differences in style of language acquisition play a role in masking the effects of child directed speech. In order to address this question, the sample was divided according to 20-month stylistic preference, and relations between 13-month maternal measures and 20-month MLU were calculated separately for each group. These relations, along with *t*-tests are displayed in Table 8. First, it should be noted that the *referential* and *expressive groups* do not differ in terms of 20-month MLU. There is also no difference between the two groups for 13-month total vocabulary size, since earlier and later talkers are represented equally in each group.

Table 7

Relations between Maternal 13-month Measures and 20-month MLU (N=45)

MATERNAL	MLU	PARTIAL OUT VOCAB SIZE
REFERENCES:		
NOUNS #	.33*	ns
OBJECT #	.39*	ns
OBJECT %	.45**	ns
PERSON %	-.36*	ns
OBJECT NOUN #	.45**	ns
OBJECT NOUN %	.41*	ns
PERSON NOUN %	-.30*	* (6%)
FUNCTIONS:		
DESCRIPTIONS #	.35*	ns
REQ. FOR INFO. #	.36*	ns
REF. REPETIT. #	.59**	ns
REF. REPETIT. %	.60**	* (7%)
CONV. DEVICE %	-.37*	ns

* $p < .05$; ** $p < .005$

From Table 8 it is evident that many relations exist between maternal references and functions and 20-month MLU for the *referential group* which are totally non-existent for the *expressive group*. Maternal number of object nouns, for example, accounts for approximately 50% of the variance in grammatical development between children in the *referential group*. Only one maternal function, referential repetitions, was related to MLU for both groups. However, while number of referential repetitions explains 79% of the variance between children in the *referential group*, the same variable accounts for only 18% for the *expressive group*. Moreover, *t*-tests indicate that for most of these variables (apart from percent of nouns and object nouns), the mothers for these two groups do not differ. Therefore, it would appear that the children in the *referential group* were actually employing a different strategy to acquire language: one which enabled them to take advantage of certain features of maternal language.

Table 8

Differential Maternal Effects on 20-month MLU

	REF. (N = 20)	EXP. (N = 25)	t
MEAN MLU	1.44 s.d.=.52	1.52 s.d.=.36	.62
REFERENCES:			
NOUNS #	.53*	.16	.80
NOUNS %	.49*	.05	2.39*
OBJECT %	.66**	.32	1.49
OBJECT NOUN #	.70**	.24	1.26
OBJECT NOUN %	.64**	.23	2.50*
ABSTRACT %	-.45*	-.09	.92
FUNCTIONS:			
DESCRIPTION #	.44*	.30	1.58
REF. REPETIT. #	.89**	.42*	.34
REF. REPETIT. %	.79**	.49*	.68
CONV. DEVICE #	-.44*	-.05	.16
CONV. DEVICE %	-.54*	-.15	.06

* $p < .05$, ** $p < .005$

Moreover, when the child's own vocabulary size at 13 months is partialled out, the relation to referential repetitions is no longer significant for the *expressive group*. However,

several maternal variables continue to make a significant unique contribution for the *referential group* (% object = 18%; # object nouns = 18%; % object nouns = 13%; # referential repetitions = 39%; % referential repetitions = 27%).

Discussion

The results of Study 1 indicate that the mothers of earlier and later talkers differ themselves at 13-months. The direction of effects cannot be untangled from the present study, but it is possible to conclude that an adequate test of the motherese hypothesis would require data from prior to 13-months. The non-effects found in previous studies with much older children are cast into doubt by the results of the present study. This is particularly the case when it is noticed that children in those studies were more similar to the group of *later talkers* in terms of MLU, while that group was precisely the group for which no relations between maternal language and grammatical development were found. Previous studies therefore may have been looking for the effects of child directed speech too late.

Study 2 reveals that when the sample is dichotomized according to the child's style of language acquisition, maternal variables have different effects depending upon the strategy adopted by the child. Several maternal variables continue to make a significant unique contribution to 20-month MLU for the *referential group* even when the effect of 13-month vocabulary size was statistically removed from the analysis. This we argue is a conservative measure, since 13-month vocabulary size for this group was itself related to several maternal variables. The possibility therefore exists that 13-month maternal language contributed both to 13-month vocabulary size and to 20-month MLU.

Since lagged associations between 13-month maternal measures and 20-month MLU revealed that children adopting referential and expressive strategies make differential use of maternal measures, we argue that, in prior studies, individual differences have masked the effects of child directed speech. Unless researchers take individual differences in style of language acquisition into account it may continue to be difficult to demonstrate consistent CDS effects, which apparently vary depending upon the match between the child's acquisition strategy and the mother's linguistic style.

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